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Anthracnose Diseases of Eastern Hardwoods

Frederick H. Berry[1]

Anthracnose diseases of hardwood trees are widespread throughout the Eastern United States. The most common symptom of these diseases is dead areas or blotches on the leaves. Because of the brown and black, scorched appearance of the leaves, the diseases are sometimes called leaf blight.

The symptoms vary somewhat, depending on the host. Under certain conditions, the whole leaf dies and falls prematurely. On some tree species, the diseases may also damage twigs, shoots, buds, and fruits. Repeated defoliation reduces growth, weakens the tree, and increases its susceptibility to attack by other pests and to winter injury.

These diseases are caused by several closely related fungi, plants that reproduce by means of spores—the fungal equivalent of seeds. Spores

[1]Supervisory Research Plant Pathologist (retired), U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station, Delaware, OH.

Figure 1—*Anthracnose on Norway maple.*

spread the disease when moved by wind, rain, or mechanical means from one host to another.

Hosts

Anthracnose fungi attack numerous hardwood species, including ash, basswood, birch, catalpa, elm, hickory, horsechestnut, London planetree, maple, oak, sycamore, tuliptree, and walnut (table 1).

Although anthracnose diseases have been found wherever these trees grow, not all hardwoods are equally affected. The diseases are particularly severe on American sycamore, white oak and other oaks in the white oak group, and black walnut. Sometimes, these species are almost completely defoliated; and on black walnut, nut production is affected. Infections are frequently found on other oak species, including scarlet, black, red, and southern red oaks; but the red oaks appear to be less susceptible than the white oaks. Pin oak, swamp chestnut oak, bur oak, and London planetree are only occasionally infected by the fungi.

Evidence of Infection

Symptoms on infected leaves range from tiny dead spots to large circular or irregular dead blotches, depending on the tree species. Dead areas are black, brown, or purple. On sycamore (cover photo) and maple (fig. 1), infected areas are often found along the veins and midrib of the leaf. The dead areas may merge until the whole leaf dies.

Infection in the early spring may turn the leaves black so that they resemble leaves damaged by frost (fig. 2). If they are not killed by the fungi, young leaves may become distorted by the unequal growth in healthy and infected parts. Distorted leaves are common on oaks.

When severely infected, trees may

Table 1—*Hardwoods affected by anthracnose diseases*

Host	Causal fungi	Parts of tree affected
Ash, several species	*Discula umbrinella* (Berk. et Br.) Sutton (= *Gloeosporium aridum*)	Leaves
Basswood	*Apiognomonia tiliae* (Rehm) v. Hoehnel (= *Gnomonia tiliae*)	Leaves, twigs
Birch, several species	*Asteroma microspermum* (Peck) Sutton (= *Gloeosporium betulae-luteae*)	Leaves
	Cryptocline betularum (Ell. et Mart.) v. Arx (= *Gloeosporium betularum*)	
Catalpa, northern and southern	*Colletotrichum gloeosporioides* (Penz.) Sacc. (= *Gloeosporium catalpae*)	Leaves
Elm, several species	*Asteroma inconspicuum* (Cav.) Sutton (= *Gloeosporium inconspicuum*)	Leaves, twigs
Hickory, several species	*Gnomonia caryae* Wolf	Leaves, twigs
Horsechestnut	*Glomerella cingulata* (Stonem.) Spauld. & Schrenk	Leaves, twigs
Maple, several species	*Kabatiella apocrypta* (Ell. et Ev.) v. Arx (= *Gloeosporium apocryptum*)	Leaves, twigs
Oak, many species	*Apiognomonia quercina* (Kleb.) v. Hoehnel (= *Gnomonia quercina*)	Leaves, twigs, buds, shoots
London planetree	*Apiognomonia veneta* (Sacc. et Speg.) v. Hoehnel (= *Gnomonia platani*)	Leaves, twigs, buds, shoots
Sycamore, American and European	*Apiognomonia veneta* (Sacc. et Speg.) v. Hoehnel (= *Gnomonia platani*)	Leaves, twigs, buds, shoots
Tuliptree or yellow-poplar	*Colletotrichum gloeosporioides* (Penz.) Sacc. (= *Gloeosporium liriodendri*)	Leaves
Walnut, several species	*Gnomonia leptosyla* Ell. et Ev.	Leaves, twigs, fruit

Figure 2—*Healthy and anthracnose-damaged leaves on sycamore.*

Figure 3—*Severely infected tree is refoliating.*

lose their leaves. But if defoliation occurs in spring or early summer, a tree will usually produce a second crop of leaves (fig. 3).

Symptoms on most trees are confined to the leaves. On sycamores and oaks, however, the fungi may also affect twigs, buds, and shoots.

Symptoms: Sycamores, Oaks

On sycamores, there are four distinct stages of anthracnose: twig blight, bud blight, shoot blight, and leaf blight. These stages often overlap (fig. 4); any one or more stages can be seen during the spring or summer when weather conditions are just right for the development of the disease.

On oaks in the white oak group, symptoms are similar to those on sycamore (fig. 5), but less severe.

Twig blight. Twig blight occurs in the spring before the leaves emerge. After the tips of 1-year-old twigs are killed, small, black fruiting bodies of the fungus soon break through the bark of

Figure 4—*Twig, bud, shoot, and leaf blight on sycamore.*

the dead twigs (fig. 6). Later, cankers—dead areas in the bark—may appear on older branches below the dead twigs (fig. 7). These cankers girdle and kill the branches.

Bud blight. Bud blight occurs at the same time as twig blight. When cankers girdle the individual buds, the buds die before the bud caps begin to break.

Figure 5—*Anthracnose infection along the vein of an oak leaf.*

Shoot blight. During the shoot blight stage, emerging shoots and new immature leaves suddenly die.

Leaf blight. In the leaf blight stage, both young and mature leaves are infected with spores produced on twigs and branch cankers. Necrotic spots or blotches are found on the leaves, and dark-brown fruiting bodies of the fungus are found on diseased leaf tissue.

Spread of Infection

The fungi that cause anthracnose overwinter on infected debris from the tree or on infected buds and cankered twigs.

In the spring during rainy periods, large numbers of microscopic spores are discharged by the fungi. The spores are windblown or splashed by the rain onto the young, growing leaves of host trees. During wet weather, the spores germinate; and the fungi penetrate the leaves, killing the new leaf tissue.

On some species, the fungi in the infected areas of new leaves produce secondary spores, called summer spores. Wind and splashing rain spread the summer spores from leaf to leaf. The rapid increase of anthracnose in the summer and early fall is caused by these summer spores. Summer spores are common on ash and walnut.

Influence of Weather

The severity of sycamore anthracnose appears to be related to prevailing temperatures during March or early April. Twig, bud, and shoot blight are more severe if the prevailing average daily temperature remains relatively cool during the period—below 70 °F (21 °C). Prolonged warm periods of 2 to 3 days when day temperatures reach 80 °F (27 °C) will prevent the development of the fungus and thereby limit the disease severity.

Anthracnose spores are spread by wind and rain. In addition, the spores need wet weather to germinate and penetrate the leaves. Therefore, anthracnose diseases may be severe in years with long, cool, rainy periods. If the following year is warm and dry, anthracnose may be inconspicuous or absent.

Control

In forest stands, anthracnose is impractical to control: spraying and pruning are far too expensive. However, management practices that allow better air movement and more sunshine, such as thinning, may inhibit the diseases by helping the foliage dry rapidly after a rain. Air circulation should be considered when planting trees susceptible to anthracnose.

Figure 6—*Fungal fruiting bodies break through the bark of a dead sycamore twig.*

Figure 7—*Canker below dead sycamore branch.*

On shade and ornamental trees and nursery stock, anthracnose can be controlled by destroying the overwintering fungi in plant materials. Raking leaves and pruning infected twigs and branches reduce the amount of inoculum available. This infected material should be burned or otherwise destroyed.

Anthracnose diseases on high-value trees and nursery stock can also be controlled by applying fungicides in the spring. Benomyl, plus a spreader-sticker applied at bud break, will provide good control. A chemical mixture of hydrated lime, copper sulfate, and water (4–4–50), known as Bordeaux mixture, is registered for use against anthracnose on elm, maple, and sycamore; dodine can be used against anthracnose of sycamore and walnut. Specific recommendations on the use of these fungicides differ with the type of anthracnose and with the locality.

Other management practices include fertilization and planting less susceptible species. The application of a complete fertilizer, such as 12–12–12, will improve the vigor of trees weakened by repeated attacks of anthracnose. Some species are less affected. London planetree is much less susceptible than American sycamore; oaks in the red oak group are generally more resistant than white oaks.

Information

Pesticides are reviewed continuously by the U.S. Environmental Protection Agency; persons contemplating their use should ensure that the materials are registered.

Private landowners can get information about anthracnose diseases from a Cooperative Extension agent at their land-grant college, a State agricultural experiment station, a county Extension office, the local State forestry office, or the Forest Pest Management staff, U.S. Department of Agriculture, Forest Service.

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Pesticides used improperly can be injurious to human beings, animals, and plants. Follow the directions and heed all precautions on labels. Store pesticides in original containers under lock and key—out of the reach of children and animals—and away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides where there is danger of drift when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment, if specified on the label.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the U.S Environmental Protection Agency, consult your local forest pathologist, county agriculture agent, or State extension specialist to be sure the intended use is still registered.

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